A NEW SPECIES OF CHLENIAS (LEPIDOPTERA, BOARMIIDAE) ON ACACIA ANEURA, WITH SOME CENTRAL AUSTRALIAN NATIVE BELIEFS ABOUT IT

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Fig. 1-9

SUMMARY

Chlenias inkata, a new Boarmiid moth with an apterous female, apparently adapted for existence in an arid environment, is described and figured from Haast Bluff, Central Australia. Its life history on common mulga (*Acacia aneura*) is outlined, and some aboriginal Australian beliefs about its larvae are given.

INTRODUCTION

During field work with the University of Adelaide Anthropological Expedition to Haast Bluff Station, in the Western MacDonnell Ranges, Central Australia, August, 1957, many Boarmiid larvae were noticed feeding on the needle-like phyllodes of mulga, *Acacia aneura.*

When disturbed either by such sounds as the clapping of hands, by shouting, or by throwing a stick into the trees, many hundreds of the larvae would drop down suddenly from the branches on long silken threads so that the tree instantly seemed to develop a silken aura. The effect was spectacular when many larvae were present. These larvae would remain suspended perhaps three to six feet from their previous perches. After an interval as long as 10 or 15 minutes they would haul themselves up again to their feeding positions.

Observations were made, specimens of the larvae placed in KAAD solution, and, prior to returning to Adelaide, some 25 live larvae were collected on 5th September, 1957. By this date they were far fewer in numbers. Those taken alive all appeared to be in the last larval instar and were from 20 to 25 mm. in length, with head diameters approaching or slightly exceeding 3 mm. In Adelaide these larvae were fed on phyllodes of mulga which had been kept fresh in a humid atmosphere until required.

Most of the larvae continued to feed until early October. All but two of them then rested in what appeared to be a pre-pupal phase for about three days, and had pupated by 5th October. The remaining two were still feeding on that day and later proved to be ones which were parasitised. They were active for several more days. From them appeared Tachinid fly larvae which pupated outside their hosts' bodies.

Pupation of the *Chlenias* larvae took place in shallow loose sand in the breeding box without indication either of a cocoon or of the spinning of silk.

The pupae had a tough cuticle, were pale creamy white, and darkened quickly to a deep chestnut brown. They were kept at normal indoor temperatures at Blackwood, near Adelaide, through the following months.

At the end of a year (August 1958) a Tachinid fly emerged; the other fly pupa died. At some time between August 1958 and January 1960, when I returned from a long visit to the United States, a Braconid wasp parasite was found to have emerged from one of the pupae. Of the remainder, at that date, some still lay dormant, others were apparently dead. They were tested by placing them against the tip of the tongue; seven of those which seemed distinctly cold to the touch of this member were alive.

In August 1960, after two years and ten months, two male moths emerged as adults and were discovered alive, but moribund, in the breeding box on 14th August. One was fully winged, the other was crippled and three of its wings were not fully expanded. Some time afterwards a wingless female emerged and freed itself from its pupal integument before succumbing. It was not noticed until after it had died. A second female was then found dead in a fully developed condition within its broken pupal shell, and further dead male examples were dissected from their pupal skins.

When this paper was being prepared for press in January 1961 two of the original pupae were still alive after three years and three months.

Brief reference was made to the larvae of this moth, as attacking *Acacia aneura*, in a paper on the vegetation of Haast Bluff, by Cleland and Tindale (1959, p. 134). In that paper they were tentatively identified as Geometrids, related to *Amelora*. Rearing of the adult moths now makes possible a more detailed account of the species and warrants giving details of its life history.

Chlenias inkata sp. nov.

♂ Antennae strongly bipectinate, pectinations long, slender, delicately haired, those near middle of length of antenna are about eight times as long as the diameter of shaft; long pectinations continue nearly to the apex. Head, patagia, and tegulae clothed in pale fawn hairs; head with face truncate, dark brown, tips of palpi just visible from above; abdomen pale brownish-fawn with long spine-like hairs of two sizes overlying more normal scales, the spine-like hairs become less obvious towards tip of abdomen. Forewings broad, well rounded, apex rounded, lightly scaled, pale brownish-fawn with isolated flecks and scattered groups of darker brown scales; these are concentrated into slightly more obvious groups on a subterminal part of each of the veins from near the anal angle to Cu_{1a} at about ⅗th—these darker scales continue in diminishing numbers on each vein to apex, with traces of other lesser groups extending towards costa at ⅘ths; fringes concolorous, anal margin clothed with longer pale silky hairs. Hindwings paler, sub-hyaline, delicately scaled, with fine hairs along the veins; fringes also delicately scaled, concolorous. Wing length 14 mm. Expanse 30 mm.

♀ Antennae filamentous, not pectinate, not markedly tapering except near apex. Head with front rounded, smooth, dark brown, palpi not visible from above. Wings absent or with only small traces of wing buds. Patagia and tegulae with long dark brown hairs, legs normal, smooth, clothed with firmly adpressed greyish-fawn scales. Abdomen stout, with smooth integument, clothed in long, straight, spine-like brown hairs each posteriorly directed; normal scales virtually absent; each abdominal segment somewhat laterally produced (in the dried out condition); these apparent processes become larger on the 6th and 7th segments; the last named process is semicircular and seemingly strongly chitinised. These may be post-mortem effects. Total length 11 mm.; greatest width of abdomen 4 mm.

Loc.: Central Australia; Haast Bluff Station, at 2,000ft., collected by N. B. Tindale, as larvae, in September 1957 and reared out in 1960.

Material: Type male (pupated October 1957, emerged August 1960) and allotype female (pupated October 1957, taken dead from remains of pupal skin): a paratype male with crippled wings (pupated October 1957, emerged August 1960) and other specimens dissected from dead pupae, including a paratype female which died just after emergence. Some larvae and pupae are preserved in alcohol and there are six slides of parts of bodies and genitalia preparations. All are registered as No. I.19110 in the South Australian Museum.

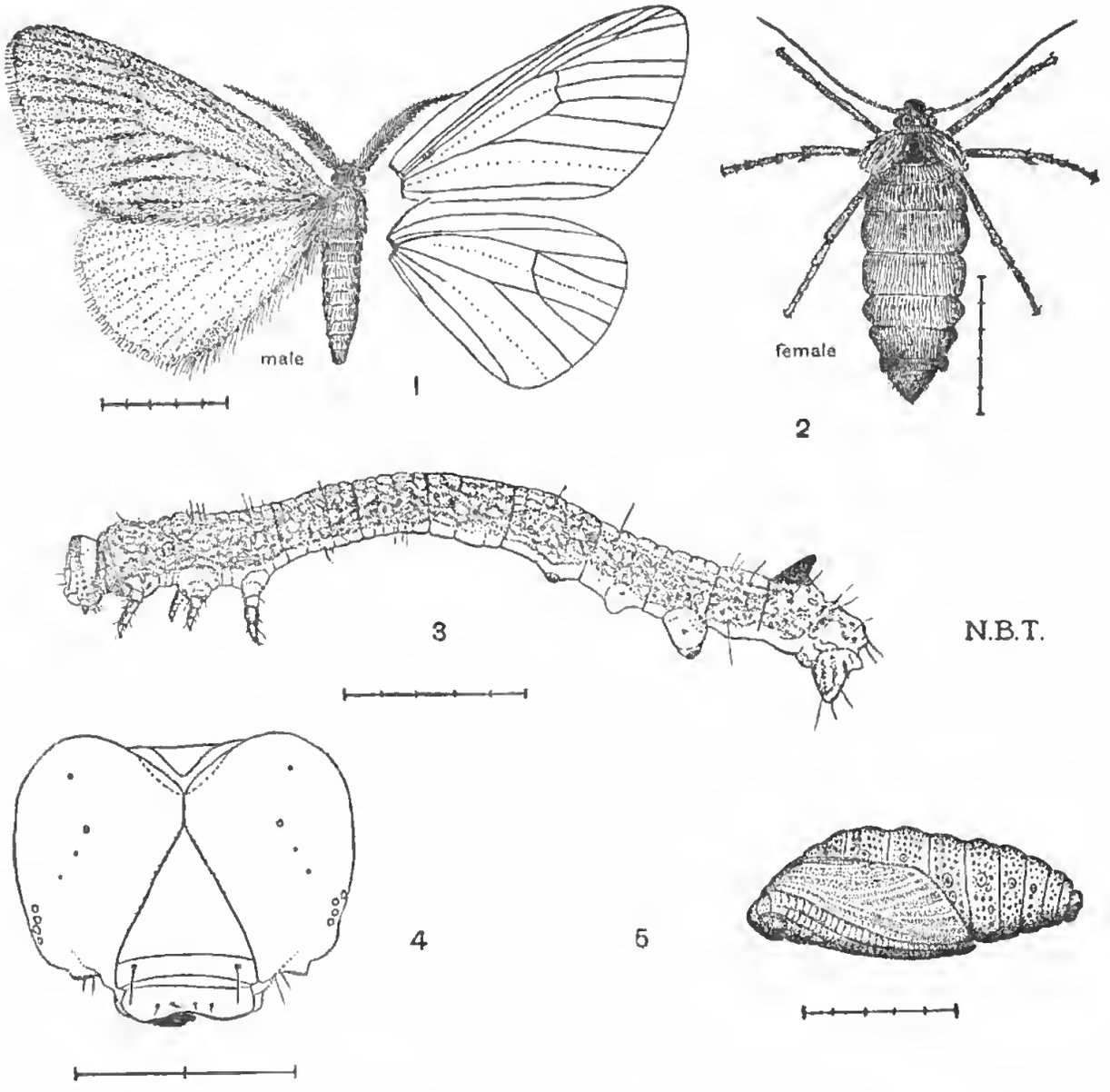

Fig. 1-5. *Chlenias inkata* Tindale. Fig. 1, male, Haast Bluff, Central Australia, 2,000ft.; Fig. 2, female, same details; Fig. 3, larva of last instar, September, 1957; Fig. 4, anterior view of head; Fig. 5, pupa of a male (where a scale is shown alongside a drawing it is to be read in millimetres).

The drawing of the male (fig. 1) is based principally on the holotype, but as the antennae of this specimen were damaged before the drawing was inked in, details were completed with the aid of other males, principally an example marked B, which has been prepared as a slide mount. The illustration of the female (fig. 2) is based on the allotype.

The adult male moth is a dismal looking and obscure member of its genus. In general appearance it seems to be nearest to *Chlenias cyclosticha* Lower (1915, p. 477), which was described from a single male taken at Broken Hill, New South Wales, in June, at a light; the type and only known specimen is in the South Australian Museum where its registration numbers are L.4389 and I.18216.

C. inkata differs from *C. cyclosticha* in its smaller size, shorter, less markedly pectinate antennae, shorter palpi and in its general appearance. The male genitalia differ in some essential points which are detailed below; sufficient basic resemblances remain to suggest that they fall into the same section of the genus *Chlenias.*

The two male genitalia drawings of *Chlenias inkata* (fig. 6-7) are based on a paratype specimen marked B, dissected from its pupal shell. The drawing was checked against a second example (specimen A), which also had been dissected from its pupal integument.

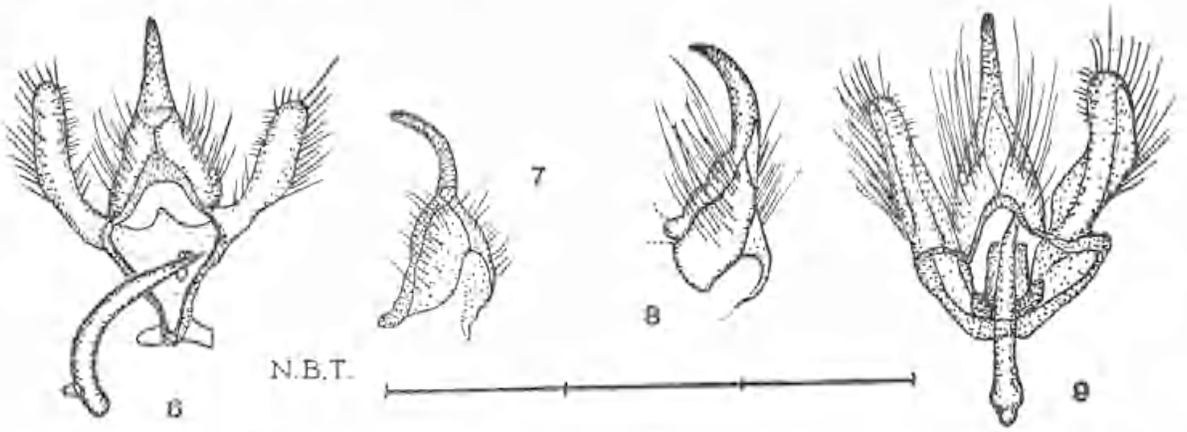

Fig. 6-9. Fig. 6, *Chlenias inkata* Tindale, dorsal view of male genitalia; Fig. 7, *ditto*, oblique view to show form of uncus; Fig. 8, *Chlenias cyclosticha* Lower, oblique view of uncus of male genitalia; Fig. 9, *ditto*, dorsal view of male genitalia (the scale to be read in millimetres).

Viewed from the dorsal surface the male genitalia of *C. inkata* differ from those of *C. cyclosticha* in the broader uncus, tapering to an acute point instead of a more rounded one. The harpes of *C. inkata* are simple, less expanded and with less evidence of flanges. The penis

appears more slender. In oblique view the uncus also appears more slender in *C. inkata* than in *C. cyclosticha* and rounded at the tip instead of sharp-pointed, thus reversing the appearance as viewed from above. In the two oblique views given, uncus and its connections are drawn principally to show the form of the apex.

The hairs in *C. cyclotricha* appear stouter than in *C. inkata* but this character must be used with caution since the mode of preparation disturbs the orderliness of such hairs.

The genitalia slide preparations were cleared in caustic potash, imbedded in P. V. A. in standard hollow cells, and ringed with a polyvinyl glue preparation.

In general the genitalia of *C. inkata* seem more compressed or widened when viewed from above while the corresponding parts of *C. cyclosticha* are more slender when viewed from this direction.

Possibly *C. cyclosticha* and C. *inkata* represent ancestral races which through long isolation from each other have become sufficiently different to be regarded as species. If this opinion is not correct and the differences have been unduly magnified they may at the least be regarded either as valid races or ends of a cline of a desert species living on both the northern and the southern sides of the belt of maximum aridity in the Australian sub-tropics. From the appearance of genitalia it can be deduced that these two species are relatively more closely related to each other than either are to the members of the section of the genus which contains *Chlenias pini* Tindale (1928, p. 43).

In searching for the life history of *C. cyclosticha* larvae should be sought on several species of *Acacia* related to *A. aneura* which occur at Broken Hill. Many Haast Bluff larvae were in the penultimate and early last instar phases of their life when first taken in August. It is possible, therefore, that, as in so many other species of *Chlenias*, the adults of *C. inkata* laid their eggs during an early month of winter, either June or early July. Lower's specimen of *C. cyclosticha* was taken at light in June; this is the same month in which the moths of southern species such as *C. banksiaria* Le G., *C. melanoxysta* Meyrick, and *C. pini* Tindale make their principal appearances in temperate Australia.

In view of the general relationship evident between the males of the two species, the female of *C. cyclosticha* may also prove to be an apterous form.

IMMATURE STAGES OF *C. INKATA*

The larva drawn (fig. 3) was in the last instar, and measured 23 mm. in length with a head diameter of just over 3 mm. It was fixed in KAAD solution and preserved in alcohol. Larvae, apparently in the previous instar appear similar but tend to lack a rather conspicuous median dorsal process which is present on the posterior part of the abdomen of the adult larva.

The adult, actively feeding larva is smooth skinned and naked except for the inconspicuous basic hairs. The general colour is a dull green, an effect resulting from a series of roughly longitudinal lines of dark olivaceous green overlying a creamy yellow background. On the dorsum the longitudinal lines are more widely spaced and on the ventral surface the larva is pale all over. On the sides the dark lines tend to be broken up and to become an intricate pattern of marblings. The patterns are seemingly not alike on any two individuals; some tend to look maze-like and others show intricate designs. The anterior part of the head has a vertically placed, dark brown, almost black band, on each side; the posterior part of the head is pale creamy-yellow; the ocelli and the principal hairs on the head tend to be ringed with patches of the darker colours. The pro-legs are pale creamy yellow with the segmental margins and the parts facing forwards touched with dark brown. The abdominal process mentioned above, when viewed from the side, usually appears dark brown, or almost black; the anal claspers are pale creamy yellow but usually are blotched with a pattern in brown pigment.

The fully fed larva becomes shortened, rather stout and swollen, and loses its bright colours. It remains almost immobile for several days in a prepupal status before pupation takes place.

The pupa as drawn (fig. 5) is that of a male. It has a length of 11 mm. and a greatest diameter close to 4.5 mm. The pupa is chestnut brown in colour, is strongly cuticled, and has a shining or polished appearance. When drawn it was dead and had dried out; pupae which were still alive after 3¼ years could only be distinguished from it by the tongue test. The wing cases show obscure pittings between the veins; in addition the thoracic segments and middle portions of each abdominal segment are pitted with large and deep, circular impressions.

A female pupa is similar to that of the male and also is 11 mm. in length, but appears larger owing to the slightly greater diameter of the abdomen (4.8 mm.). Normal wing cases are present, no

apparent reduction of wing is registered in the pupal integument. The antennal sheath is more slender than in the male and indicates lack of pectinations by a less complex patterning of the surface.

Since the moth itself is known only by these bred examples, nothing can be recorded of the habits of the free living prepupal larva, the type of shelter sought for pupation, or the time and circumstances in which the adult stage is passed. The pupal skin itself is stout and may be ant-proof. The female is strongly clothed in firmly adpressed spine-like hairs and in this respect seems to depart rather markedly from kindred species of *Chlenias* with normally winged females. The presence of these features may suggest that the moth is equipped for close association with honey ants, which throng the same trees. Aboriginal Australian beliefs regarding the larva of this moth, which are detailed below suggest they have observed a close association between ants and the larvae, even though their biological observations and deductions, in other respects, are rather wide of the mark.

The conditions in which the pupae were kept at Blackwood, 850ft. above sea level in latitude 35° S, were artificial, and in no close way resembled the climate of their home near Haast Bluff, at 2,000ft. elevation in latitude 23° 30′ S. It would therefore be unwise to draw any firm conclusions from their long endurance as pupae and from the emergence of some of the survivors after nearly three years in a dormant condition. Their persistence, however, does hint at one of the possible mechanisms of survival in the relatively arid surroundings of the MacDonnell Ranges.

Most members of the *Chlenias* group are so characteristic of the cool moist temperate areas of Australia that it was a distinct surprise to find this species in Central Australia and to find it so curiously adapted to its desert mountain environment.

It will be interesting to learn whether the species is confined to the mulga plains at higher altitudes within the MacDonnell Ranges, where rainfall, although very unreliable, is much higher than on the open desert plains to the south, or whether it has been able to extend its domain over the whole extent of the mulga covered lake plains of the desert interior of Australia. The presence at Broken Hill, on the south side of the belt of maximum aridity of what appears to be a separate species, *C. cyclosticha*, may suggest that *C. inkata* is not now able to live over the whole area of mulga desert but may be a relict form confined to areas of less confirmed aridity within Central Australia.

NATIVE BELIEFS ABOUT *CHLENIAS INKATA*

In Aranda mythology there is an association between the larvae of this moth, the mulga tree, the jeramba ['jeramba], honey ant (*Melophorus bagoti* Lubbock) and the lataruba ['lataruba] or spur-winged plover (*Lobibyx novaehollandiae*) leading to a strange admixture of observed fact, wrong association and false deduction.

The *Chlenias* larva is called kapadada ['kapada:da] or ngarda ['ŋarda] and it is regarded as the inkata ['iŋkata] or totemic "leader" (colloquially translated as "the boss") of the jeramba or honey ant. In their belief kapadada appears and causes little globules of honey dew to develop near the bases of the young phyllodes of *Acacia aneura* shrubs and trees. When one looks at the fresh growth, in August, against the sunlight, these little globules of sap, which natives call lutandja ['lutandja] glisten in the light.

They are a natural secretion from a gland near the base of the young phyllode. In Aranda belief, these globules, under the compelling force of the inkata, become larger, form along the stems and become lac scales (*Austrotachardia acaciae* Maskell), which yield sugar. These also are called lutandja. Jeramba honey ants gather the sap from the mulga phyllodes and the sugar of the lerp scales. They take it all below ground under the "direction" of the inkata, to feed their passive companions which become the living containers for the honey which they store. The natives do not associate inkata with any adult moth. They recognize that the larva goes into the ground near the ant nests and becomes a hard-shelled pupa. This they falsely associate with a stage of honey ant life.

Following the season of summer rains there is an appearance of sap in these mulga trees; at the same time the early stages of the life cycles of a whole suite of associated insects appear together. It is not altogether surprising that the aborigines with a less than complete interest in these insect life histories should incorrectly observe, and falsely entwine them into their beliefs.

There is said to be an Aranda song series which describes the part taken by kapadada, in a human form, in the development of the story of the jeramba or honey ant totem. The spur-winged plover man also plays an active part in the same story.

The Kukatja have similar beliefs about the *Chlenias* larva and call it ['pun:u 'parutji:ta] where ['puu:u] is a word meaning stick or tree. In the previously mentioned brief account of the botany of the Haast Bluff area (Cleland and Tindale 1959, p. 134) this Kukatja name was unfortunately given in error as ['pun:a 'parutji:ta].

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